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L5: Entry 1 of 11 File: USPT Aug 8, 2000

US-PAT-NO: 6099670
DOCUMENT-IDENTIFIER: US 6099670 A

TITLE: Ultrasonic bonding method

DATE-ISSUED: August 8, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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US-CL-CURRENT: 156/73.1; 156/580.2, 264/444

CLAIMS:

What is claimed is:
1. A method of high speed bonding at least one material including at least one thermoplastic component, the method comprising:
applying acoustic energy, using an acoustic horn and an anvil, to the material;
applying force to at least one of the horn and the anvil to yield a peak pressure between the horn and the anvil of at least 2.068.times.10.sup.7 N/m.sup.2 ; and
applying the acoustic energy and pressure for a time sufficient to create bonds in the material such that the material is sufficiently quenched before reducing the pressure.
2. The method of claim 1 wherein the step of applying force comprises applying a pressure of at least 3.448.times.10.sup.7 N/m.sup.2.
3. The method of claim 1 wherein the step of applying force comprises applying a pressure of at least 6.895.times.10.sup.7 N/m.sup.2.
4. A method of high speed bonding at least one material including at least one thermoplastic component, the method comprising:
applying acoustic energy, using an acoustic horn and an anvil, to the material at an amplitude of vibration selected in combination with the frequency of vibration to yield an acoustic velocity of no greater than 4.72 m/s; and
applying force to at least one of the horn and the anvil to yield a peak pressure between the horn and the anvil of at least 2.068.times.10.sup.7 N/m.sup.2.
5. The method of claim 4 wherein the total basis weight of the material is at least 200 gm/m.sup.2.
6. The method of claim 4 wherein the steps of applying acoustic energy and applying pressure comprise applying the acoustic energy and pressure for a time sufficient to create bonds in the material such that the material is sufficiently quenched before reducing the pressure.
7. The method of claim 6 wherein the steps of applying acoustic energy and applying pressure comprise applying the acoustic energy and pressure to reach thermoplastic peak temperatures such that sufficient heating occurs to create acceptable bond strength and the bond area is cooled adequately and in sufficient time to prevent internal and external stresses from adversely affecting bond quality and to prevent bond degradation such as holes or cut edges.
8. The method of claim 4 wherein the step of applying acoustic energy comprises applying acoustic energy at a frequency of at least 10,000 Hz.
9. The method of claim 8 wherein the step of applying acoustic energy comprises applying acoustic energy at a frequency of from 14,000 Hz through 32,000 Hz.
10. The method of claim 4 wherein at least one of: the step of applying acoustic

energy comprises applying acoustic energy at an amplitude of vibration selected in combination with the frequency of vibration to yield an acoustic velocity of no greater than 3.15 m/s; and the step of applying pressure comprises applying a pressure of at least 6.895.times.10.sup.7 N/m.sup.2.
11. The method of claim 10 wherein the frequency of vibration is 20,000 Hz.
12. The method of claim 1 wherein the step of applying acoustic energy comprises at least one of continuous and plunge welding.
13. The method of claim 1 wherein the step of applying acoustic energy comprises continuous welding with the materials moving past the acoustic horn at speeds of more than 30 m/min.
14. The method of claim 1 wherein at least one of the components is one of a woven layer; a film; a non-woven; and a non-thermoplastic material.
15. The method of claim 1 wherein all of the components are thermoplastic non-wovens.
16. The method of claim 1 further comprising the step of selecting the anvil dimensions in combination with the properties of the material being bonded, the amplitude of the applied acoustic energy and the pressure on the anvil, and the thermal conductivities of the horn and anvil.
17. A method of high speed bonding at least one material including at least one thermoplastic component wherein the total basis weight of the material is at least 200 gm/m.sup.2, the method comprising:
applying acoustic energy, using an acoustic horn and anvil, to the material; and applying force to at least one of the horn and the anvil to yield a peak pressure between the horn and the anvil of at least 2.068.times.10.sup.7 N/m.sup.2, wherein both applying steps comprise applying the acoustic energy and pressure for a time sufficient to create bonds within the material such that the material is sufficiently quenched before reducing the pressure.
18. The method of claim 1 further comprising the step of at least partially supporting the horn by a support member in at least one of sliding and rolling contact with the horn.
19. The method of claim 1 where the step of applying force comprises choosing an appropriate mass of at least one of the horn and anvil to compensate for intermittent thickness variations of the incoming material, by increasing the force using inertial forces.

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L5: Entry 10 of 11 File: USPT Apr 25, 1978

US-PAT-NO: 4086112
DOCUMENT-IDENTIFIER: US 4086112 A

TITLE: Method of printing fabrics

DATE-ISSUED: April 25, 1978

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Porter; Kenneth	Harrogate			EN

US-CL-CURRENT: 156/73.1; 156/234, 156/238, 156/277, 156/290, 347/171, 428/198, 428/207, 8/471

CLAIMS:

What we claim is:
1. A method of simultaneously dyeing and bonding a fabric comprising thermoplastic fibres, wherein a transfer sheet supporting an ink comprising a heat transferable dyestuff is contacted with said fabric, and the sheet and fabric are subjected to heat and pressure in spaced discrete areas such that the fabric becomes thermally bonded and the dyestuff is transferred from the transfer sheet to the fabric at least in areas corresponding to said discrete areas.
2. A method according to claim 1 wherein said fabric is a non-woven fibrous web.
3. A method according to claim 1 wherein said fabric is subjected to heat and pressure for less than 1 second.
4. A method according to claim 1 wherein the transfer sheet is preheated before being contacted with the said fabric.
5. A method according to claim 1 wherein the thermoplastic fibres are formed from a polyamide, the dyed and bonded fabric being further subjected to a steam treatment followed by a hot water wash.
6. A method according to claim 1 wherein heat and pressure are supplied in a nip between an ultrasonically energized horn and an anvil provided with a surface pattern of raised lands, the transfer sheet being positioned between the fabric and the anvil.
7. A method of printing and bonding a fabric of thermoplastic fibers comprising contacting the surface of the fabric with a transverse sheet which supports an ink comprising a heat transferable dyestuff, and
subjecting said sheet and fabric to heat and pressure in spaced discrete areas, the combination of said heat and pressure being effective to cause simultaneous (1) thermal bonding of said fabric in said spaced discrete areas and (2) transfer of the dyestuff from said transfer sheet to the fabric at least in areas corresponding to said spaced discrete areas.